

RAMBLINGS

THE TIMEX™ COMPUTER CLUB NEWSLETTER

For
Timex
Computer Club
Members

SCHOOL OF THOUGHT — THE TIMEX EDUCATION PROGRAM

Computer literacy means many different things to many different people.

Philosophically, **TIMEX** views computer literacy as "... a working knowledge of the computer which enables the individual to utilize the computer as an extension of his or her own mind ..."

Putting this philosophy to work requires knowledge of:

- The computer and its capabilities
- Input, processing, and retrieval routines that manipulate the computer and its data
- An elementary (at least) understanding of **TIMEX** Basic programming
- Methods of utilizing prerecorded software

The **TIMEX** Education Program works with the academic community to organize and originate computer literacy curriculums at multi-levels: In public and parochial school districts, on the college campus, for adult education training centers, at computer camps, and through circulation by public library systems.

To meet these ambitious goals, a comprehensive **TIMEX** Education Program has been developed which includes:

- Teacher Training
- Teacher Support
- Hardware Competency
- Administrative Software
- Self-teaching Software
- Minimal Investment
- Fund Raising Activities
- Educator's Newsletter

Teacher Training — Operating at an educator-to-educator level, the program works in the following manner: A teacher from a school district attends university-based seminars (ranging from 5 to 30-hours) which acquaints the educator with the **TIMEX Personal Computer** — its features, concepts and operation. (The teacher receives graduate-level credit and/or in-service credit for each seminar.)

Back home, the educator proceeds to train other teachers from the school district.

Then, working like a pyramid, computer literacy flows downward from a single educator to many educators and ultimately is spread amongst a great number of students.

Teacher Support — Comprehensive educator-level materials help the teacher introduce **TIMEX**-related computer science into the classroom. These support materials include: workbooks (both programming and computer operation), lesson plans, paraphernalia for audio-visual presentations, and CAI software.

CAI (Computer Aided Instruction) software is an important teacher/pupil aid. Through this mechanism classroom instruction is supplemented by computer-based tutelage. In addition to stimulating student interest, CAI offers individual instruction, reinforces new learning skills, and facilitates teacher monitoring of student progress.

CAI instruction is provided by more than 30-**TIMEX** software modules (now under development) in diverse disciplines such as social sciences, language arts, physical sciences, mathematics, and computer science.

Hardware Competency — As computer literacy advances, increasingly sophisti-

Continued on Page 5

HOW TO GET RID OF BUGS

Hopefully, this won't happen to you! But should your "home-grown" program be bugged by bugs (a **bug** is an error in a program such as a wrong character), there's an easy way to utilize the computer to eradicate these pesky characters.

EDIT CURSOR — A DEBUGGING AGENT

In a previous issue of **RAMBLINGS**, we discussed five of the cursors that are utilized with the **TIMEX Sinclair Personal Computer**. However, there's one cursor that we didn't describe. That's the Edit cursor — the topic of this article.

Because this cursor is utilized as a "program editor," small changes (i.e., modifying a statement or part of a statement) can be made without disrupting the remainder of the program. This is particularly useful during the debugging process — especially when a large program is involved.

When the Edit cursor is displayed on your television screen, it takes the form of an inverse "greater than" symbol **>**.

We'll illustrate the use of the Edit cursor through the following example: In the program below, Statement 80 contains a bug; the **GOTO** command should specify Statement 130 instead of 120. Here's how we make the correction:

```

10 PRINT "I AM THINKING OF A"
20 PRINT "NUMBER BETWEEN 1 AND 100"
30 PRINT "CAN YOU GUESS IT?"
40 LET A = INT (RND * 100) + 1
50 INPUT B
60 IF A < B THEN GOTO 90
70 IF A > B THEN GOTO 110
80 IF A = B THEN GOTO 120
90 PRINT B: "TOO HIGH"
100 GOTO 50
110 PRINT B: "TOO LOW"
120 GOTO 50
130 PRINT B: "CORRECT"

```

PROGRAM WITH A BUG

Continued on Page 3

FEATURES in this issue:

"Pilot to Control Tower ... Request Permission to Land"	page 2
Buy 2 — Get 2 Free	page 4
New Bi-Monthly Format	page 4
Early Bird Specials	page 5
Timex Software Contest	page 6
Ramblin' Around	page 6
The Forum	page 7
Computer Vocabulary	page 8

VOLUME 1, NUMBER 4
JUNE, JULY, AUGUST 1983

“PILOT TO CONTROL TOWER ... REQUEST PERMISSION TO LAND”

Let your imagination soar and experience the thrill of flying an airplane — right in the comfort of your own home. The **TIMEX Flight Simulator** is an educational and fun-filled software cassette that puts you at the controls of a twin-engine, high-performance, propeller-driven airplane. You'll need skill, steady hands, and a knowledge of aerodynamics and navigation (which you'll learn from the software) to fly to and land your plane.

Aircraft flight is governed by two aerodynamic principles: lift and forward speed. Lift is created by airflow over the wings of the aircraft, creating lift from below. The extension of the flaps — from the wings — alters the airflow to increase or decrease the amount of lift.

Once off the ground, forward speed keeps the aircraft up, in the air.

LET'S TAKE OFF

Start your engines by entering the command **LOAD "FLIGHT"** or **LOAD " "** and press the ENTER key. The program loads in about six minutes and concludes with a load check. If the check indicates that the load failed, please reload the program.

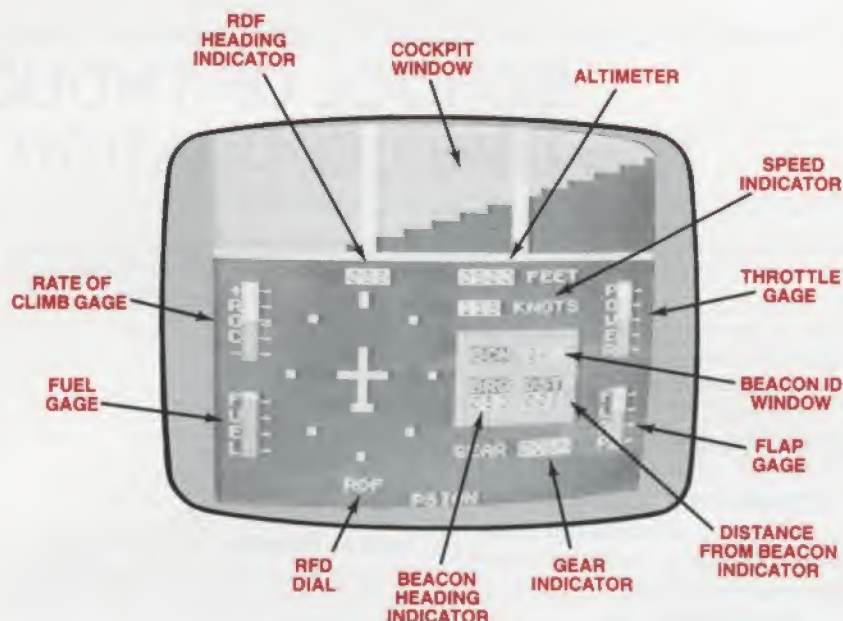
To begin your flight, select the appropriate option by answering **Y** (yes) or **N** (no) to the options displayed on the screen.

- Full Flight
- Landing Practice
- Wind Effects (recommended only for the experienced pilot).

TAKE THE PILOT'S SEAT

Once you have taken your seat in the cockpit, the Instrument Panel, the Navigation Map, the Instrument Landing System (ILS), and the pilot's controls are used to fly to the airport and land on the runway.

Flying your **T/S** airplane requires your close attention to the Instrument Panel illustrated and defined below. It will be necessary to pilot the plane along the correct vector (course or compass direction) and the proper heading (compass direction in which the aircraft points) to reach the airport. Then you will have to bank (turn) the airplane onto the final approach and land the plane at the proper speed, rate of descent, and angle of descent.



INSTRUMENT PANEL

INDICATOR OR GAGE	FUNCTION
ROC (Rate of Climb) Gage	Graduated in units of 600-feet per-minute, it indicates the speed at which the airplane is climbing or descending (+ is climbing; - is descending).
Fuel Gage	Amount of fuel remaining.
RDF (Radio Directional Frequency) Dial	Facsimile of an airplane, in the center of the dial, indicates the direction in which the plane is traveling. The blinking rectangular light — which rotates around the little airplane — indicates the movement of the plane (i.e., banking the plane to turn onto another heading).
BRG Indicator	Bearing (or heading) in which the plane must travel in order to reach the Beacon onto which the RDF has been "locked."
GEAR Indicator	Reads UP or DOWN depending upon whether the wheels have been raised or lowered.
DST Indicator	Distance — in nautical miles — from the Beacon onto which the RDF has been "locked."
FLAP Gage	Marked in increments of 1/4, to indicate how much flap has been applied.
Beacon ID Indicator	Identifies Beacon (there are a total of seven) to which the RDF has been "locked."
Throttle Gage	Divided into units of 20%, to indicate the amount of power supplied to the engines.
Speed Indicator	Speed — in knots — of the aircraft.
Cockpit Window	Light area is sky; dark area is ground. View changes when aircraft climbs, descends, or turns.
Altimeter	Height — in feet — of airplane above sea level.
RDF Heading Indicator	Numerical compass-point value of heading (direction) in which the plane is traveling.

Continued on Page 4

How to Get Rid of Bugs Continued

1. Simultaneously press the LIST (K) keys to list the program (the **LIST** command can be initiated when the **K** cursor is displayed on the screen).
2. Simultaneously press the SHIFT and the Down Arrow (#6) keys. The Edit cursor is now displayed at the first statement at the top of the screen:

```

10 PRINT "I AM THINKING OF A"
20 PRINT "NUMBER BETWEEN 1 AND
100"
30 PRINT "CAN YOU GUESS IT?"
40 LET A = INT (RND*100) + 1
50 INPUT B
60 IF A < B THEN GOTO 90
70 IF A > B THEN GOTO 110
80 IF A = B THEN GOTO 120
90 PRINT B; "TOO HIGH"
100 GOTO 50
110 PRINT B; "TOO LOW"
120 GOTO 50
130 PRINT B; "CORRECT"
    
```

EDIT CURSOR AT FIRST STATEMENT

3. Repeat Step 2 until the Edit cursor is positioned at Statement 80, as illustrated below:

```

10 PRINT "I AM THINKING OF A"
20 PRINT "NUMBER BETWEEN 1 AND
100"
30 PRINT "CAN YOU GUESS IT?"
40 LET A = INT (RND*100) + 1
50 INPUT B
60 IF A < B THEN GOTO 90
70 IF A > B THEN GOTO 110
80 IF A = B THEN GOTO 120
90 PRINT B; "TOO HIGH"
100 GOTO 50
110 PRINT B; "TOO LOW"
120 GOTO 50
130 PRINT B; "CORRECT"
    
```

CURSOR MOVED TO STATEMENT 80

(If the bug is spotted when you are in the midst of working on a program, you can eliminate Steps 1 and 2. When performing Step 3, use the Up Arrow (#7) and SHIFT keys to move the cursor upward. When the cursor is positioned at the appropriate statement, proceed to Step 4, below). (As an alternative to Steps 1 through 3, type the command **LIST 80** and press the ENTER key to move directly to the statement that is to be edited. Then proceed with Steps 4, 5, and 6, below).

4. Simultaneously press the SHIFT and the EDIT (#1) keys to display the statement — to be corrected — at the bottom of the screen:

```

10 PRINT "I AM THINKING OF A"
20 PRINT "NUMBER BETWEEN 1 AND
100"
30 PRINT "CAN YOU GUESS IT?"
40 LET A = INT (RND*100) + 1
50 INPUT B
60 IF A < B THEN GOTO 90
70 IF A > B THEN GOTO 110
80 IF A = B THEN GOTO 120
90 PRINT B; "TOO HIGH"
100 GOTO 50
110 PRINT B; "TOO LOW"
120 GOTO 50
130 PRINT B; "CORRECT"
80 IF A = B THEN GOTO 120
    
```

CURSOR AT BOTTOM OF SCREEN

5. The illustration below demonstrates Step 5. Use the appropriate arrow key (#5 ← or #8 →) to move the cursor to the position — on the statement line — where the correction is to be made. Then, proceed to type the correction (if necessary the deletion function — SHIFT and 0 keys) can be utilized to make the correction. You may need to move the cursor past the error before making the deletion. The Arrow key can be used to accomplish this.

```

10 PRINT "I AM THINKING OF A"
20 PRINT "NUMBER BETWEEN 1 AND
100"
30 PRINT "CAN YOU GUESS IT?"
40 LET A = INT (RND*100) + 1
50 INPUT B
60 IF A < B THEN GOTO 90
70 IF A > B THEN GOTO 110
80 IF A = B THEN GOTO 120
90 PRINT B; "TOO HIGH"
100 GOTO 50
110 PRINT B; "TOO LOW"
120 GOTO 50
130 PRINT B; "CORRECT"
80 IF A = B THEN GOTO 120
    
```

MOVE CURSOR TO EDIT LOCATION

6. Press the ENTER key to accept the corrected statement; the edited program is as illustrated in the following manner:

```

10 PRINT "I AM THINKING OF A"
20 PRINT "NUMBER BETWEEN 1 AND
100"
30 PRINT "CAN YOU GUESS IT?"
40 LET A = INT (RND*100) + 1
50 INPUT B
60 IF A < B THEN GOTO 90
70 IF A > B THEN GOTO 110
80 IF A = B THEN GOTO 130
90 PRINT B; "TOO HIGH"
100 GOTO 50
110 PRINT B; "TOO LOW"
120 GOTO 50
130 PRINT B; "CORRECT"
    
```

EDITED PROGRAM

Incidentally, this program does work and is fun to use. To run it, copy the program and then press the RUN (R) key. When the **L** cursor appears at the bottom of the screen, simply enter a number (from 1 to 100) until you have guessed the correct answer.

Finally, the sidebar explains the logic behind this program. This explanation may be helpful to the first-time programmer.



ANATOMY OF A PROGRAM

You might recognize this program as being an expanded version of the one which appears on page 31 of your **T/S 1000 User Manual**.

Statements 10 through 30 are simple print commands.

Statement 40 is much more complex. In this statement, we are telling the computer to randomly (**RND**) select a number (**INT**; an integer) between 1 and 100 and to store it in a location we shall call A (**LET A =**). Now, since the computer produces an (integer) fractional number (less than 1), we multiply that integer by 100 (**RND*100**). And since we want a universe of 100 numbers, we then add 1 to the random command (**RND*100**) + 1.

Statement 50 tells the computer that we will input certain data (a number) and we want the computer to store this input at a location we shall call B.

Statement 60 is a yes/no compare statement. We are telling the computer that if the number the computer has stored in location A is **less** than the number stored in location B, proceed to carry out the instruction stated in Statement 90; otherwise, go to the next statement (70).

Statement 70 is the reverse of Statement 60; if the number the computer has stored in location A is **greater** than the number stored in location B, the computer is to carry out the instruction listed in Statement 110; otherwise, proceed to Statement 80.

Statement 80 asks the computer to **compare** the numbers stored in locations A and B, and if they are **equal**, carry out the instructions specified in Statement 130.

Statements 90, 110, and 130 are simple print commands. Note that the (;B) tells the computer to also print the number that was input at the keyboard.

Statements 100 and 120 are also compare statements. In effect, they tell the computer that since the number we input was either too high or too low, we will input another number — to try again (at Statement 50).



Pilot to Control Tower Continued

THE PILOT IS IN CONTROL

Several controls are needed to fly your plane. The principle ones — on an actual airplane — are the control stick, flap, throttle, and landing gear.

For example, moving the control stick sideways works the ailerons on the wings so the airplane banks to the left or right, as appropriate. In a similar manner, pushing the control stick forwards, or pulling it backwards manipulates the elevators on the rear of the plane to cause the plane to climb or descend, respectively.

Your T/S aircraft is equipped with the following controls, which simulate those of a typical aircraft of this type.

KEY FUNCTION

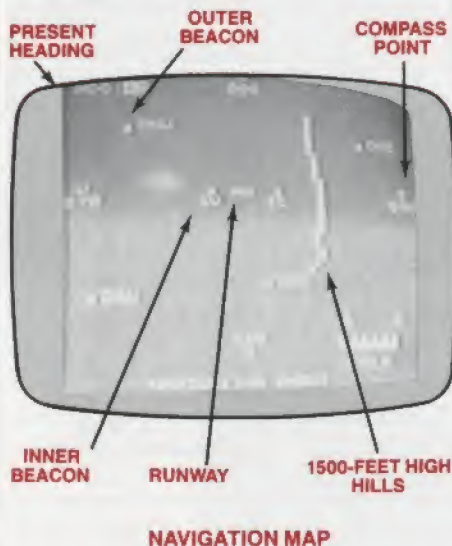
- ↑ When pressed, plane loses altitude.
- ↓ When pressed, plane gains altitude.
- When pressed, plane banks (turns) to the right.
- ← When pressed, plane banks (turns) to the left.
- P When pressed, plane gains airspeed.
- O When pressed, plane loses airspeed.
- F When pressed, the flap is lowered.
- D When pressed, the flap is retracted.
- G When pressed, the landing gear is either lowered or raised.
- B When pressed, successively displays the ID of each Beacon.
- M When pressed (when the Instrument Panel is displayed), the current display is erased and the Navigation Map appears; when pressed with the Navigation Map displayed, the Instrument Panel reappears.
- V When pressed (when the Instrument Panel is displayed), the current display is erased and the ILS appears; when pressed with the ILS displayed, the Instrument Panel reappears.

MAPPING OUT YOUR FLIGHT

It is a good idea to use the Navigation Map to travel to the airport. To view the map (when the Instrument Panel is displayed), press the M key on the keyboard.

The Navigation Map is illustrated below. On the map you'll find the four points of the compass, the Beacons, the current heading of the aircraft, and an aircraft hazard consisting of a series of hills to the East of the runway. These hills rise to an altitude of some 1500-feet above sea level and are located about 7½-miles from the runway. The position of your plane is shown as a moving, blinking, rectangular light. As you can see, the runway runs on an East-to-West axis; therefore, it will be necessary to bank

onto a heading of either 90- or 120-degrees to start your final approach.



In order to approach the runway properly, the airplane must gradually descend at an angle of about 3-degrees. This angle of descent implies a height of about 6,000-feet at 20-miles from the runway, 3,000-feet at 10-miles out, and 1,000-feet at the 3½-mile mark. You can easily make the height adjustments "on the fly."

At the start of your flight, the computer will randomly select a starting point. From this position, you must find your way to the runway.

To chart your course, select an Outer Beacon as a guidepost and press the B key (the Instrument Panel is displayed during this step) until the Beacon ID is displayed (a Beacon is a radio beam which plots the position of the aircraft based on the intensity of the signal). Note the heading in the BRG "window" and bank the aircraft until that heading is displayed in the RDF Heading "window" above the RDF Dial.

As the aircraft approaches the 90 E / 270 W axis, you will probably need to bank the airplane to line-up with the runway. Do so by selecting the appropriate Inner Beacon (the Inner Beacon is about 2-miles from the runway) and adjust your heading accordingly.

Finally, as the Inner Beacon is approached, the heading of the aircraft may need to be slightly adjusted to obtain a more precise alignment with the runway. The Runway Beacon (there is no ID designation for this Beacon in the Beacon ID "window") can be utilized to obtain the heading to turn the plane onto its final approach.

TOUCHDOWN

In a manner analogous to the standard-shift automobile, on which the clutch, shift lever, brake pedal, and steering wheel must all be engaged when stopping the vehicle, full flaps must be applied, the landing gear

Continued on Page 5

BUY 2 — GET 2 FREE

Here's a special **TIMEX 1000** series cassette software offer!

Buy two software cassettes at our regular, low price and get two more cassettes **FREE**.

This special offer is made for two reasons: To introduce members of the **TIMEX Computer Club** to the quality and convenience of **TIMEX** prerecorded software, and to give you the opportunity to obtain **TIMEX** software products which you may not be able to locate at your local **TIMEX** retailer.

This offer is good only in the U.S.A. and ends November 30, 1983. All orders must be received by no later than January 15, 1984. This offer cannot be combined with any other **TIMEX Computer Corporation** offer.

To order your software and select your two **FREE** cassettes, please follow the directions below:

- 1) On the **RAMBLINGS** order form, check the appropriate box and indicate the quantity desired.
- 2) To select your two **FREE** cassettes, simply write the word **FREE** in the quantity column. Any two cassettes on the order form may be selected.
- 3) Total the amount of your purchase, including shipping and handling and sales tax (if applicable) and enclose your check or money order with your order, or indicate the appropriate credit card information.

For faster service you may place your order by phone. Simply call 1-800-24-**TIMEX**.

This offer ends November 30, 1983. Please allow 4-6 weeks for delivery.

**NEW BI-MONTHLY FORMAT**

Beginning with this issue, **RAMBLINGS** will be published and distributed bi-monthly. Not only will you receive **RAMBLINGS** at timely and regularly scheduled intervals, but as a member of the **TIMEX Computer Club**, you'll also be able to take advantage of special **TCC** members-only offers, and be among the first to learn about exciting new products from **TIMEX Computer Corporation**.



TIMEX

T/S 1000 SERIES

SOFTWARE

Ramblings Special Order Form

Cassette Number	Cassette Description	Regular Price	Qty.
CATEGORY: HOME SOFTWARE			
<input type="checkbox"/> 02-2000*	KEYBOARD CALCULATOR	\$ 9.95	_____
<input type="checkbox"/> 03-2000	ORGANIZER	16.95	_____
<input type="checkbox"/> 03-2001	BUDGETER	15.95	_____
<input type="checkbox"/> 03-2002	LOAN/MORTGAGE AMORTIZER	14.95	_____
<input type="checkbox"/> 03-2003	CHECKBOOK MANAGER	15.95	_____
<input type="checkbox"/> 03-2004	COUPON MANAGER	12.95	_____
<input type="checkbox"/> 03-2005	CAR POOLER	14.95	_____
<input type="checkbox"/> 03-2006	STAMP COLLECTOR	16.95	_____
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<input type="checkbox"/> 03-2009	HOME ASSET MANAGER	12.95	_____
<input type="checkbox"/> 03-2010	IRA PLANNER	15.95	_____
<input type="checkbox"/> 03-2011	AUTOMOBILE ANALYZER	12.95	_____
<input type="checkbox"/> 03-2012	REAL ESTATE INVESTMENT ANALYSIS	14.95	_____
<input type="checkbox"/> 03-2013	PERSONAL FINANCE PLANNER	12.95	_____
<input type="checkbox"/> 03-2014	PORTFOLIO ANALYSIS	14.95	_____
<input type="checkbox"/> 03-2015	HEATING SYSTEM ANALYZER	9.95	_____
<input type="checkbox"/> 03-2017	SOLAR WATER HEATER DESIGNER	12.95	_____
<input type="checkbox"/> 03-2018	COLLEGE COST ANALYZER	9.95	_____
<input type="checkbox"/> 03-2019	ELECTRIC COST ANALYZER	9.95	_____
CATEGORY: BUSINESS SOFTWARE			
<input type="checkbox"/> 02-1000*	STATISTICS	9.95	_____
<input type="checkbox"/> 02-1001*	MONEY ANALYZER I	9.95	_____
<input type="checkbox"/> 02-1002*	MONEY ANALYZER II	9.95	_____
<input type="checkbox"/> 03-1000	VU-CALC	19.95	_____
<input type="checkbox"/> 03-1001	INVENTORY CONTROL	19.95	_____
<input type="checkbox"/> 03-1002	MANUFACTURING CONTROL	19.95	_____
<input type="checkbox"/> 03-1003	CRITICAL PATH ANALYSIS	19.95	_____
<input type="checkbox"/> 03-1004	LIST MANAGER	14.95	_____
<input type="checkbox"/> 03-1005	STOCK MARKET TECH. ANALYSIS I	10.95	_____
CATEGORY: EDUCATIONAL SOFTWARE			
<input type="checkbox"/> 02-3001*	POWER PACK I	\$ 9.95	_____
<input type="checkbox"/> 02-3002*	GEOMETRY I	10.95	_____
<input type="checkbox"/> 02-3003*	ALGEBRA I	10.95	_____
<input type="checkbox"/> 02-3004*	ALGEBRA II	10.95	_____
<input type="checkbox"/> 03-3000	SUPER MATH	14.95	_____
<input type="checkbox"/> 03-3001	STATES AND CAPITALS	12.95	_____
<input type="checkbox"/> 03-3002	FLIGHT SIMULATOR	19.95	_____
<input type="checkbox"/> 03-3003	PRESIDENTS	10.95	_____
<input type="checkbox"/> 03-3005	PUNCTUATION MASTER	10.95	_____
<input type="checkbox"/> 03-3006	ATOR THE ABC GATOR	12.95	_____
<input type="checkbox"/> 03-3007	CAPITALIZATION MASTER	10.95	_____
<input type="checkbox"/> 03-3008	E.E.I. FILTER DESIGN	12.95	_____

Cassette Number	Cassette Description	Regular Price	Qty.
<input type="checkbox"/> 03-3009	GUITAR FOR BEGINNERS	10.95	_____
<input type="checkbox"/> 03-3010	LANGUAGE USAGE	9.95	_____
<input type="checkbox"/> 03-3011	SUPERDOODLES	9.95	_____
<input type="checkbox"/> 03-3012	TOTAL TRIANGLES	9.95	_____
<input type="checkbox"/> 03-3013	MUSIC EDUCATOR I	9.95	_____
<input type="checkbox"/> 03-3014	CONVERSATIONAL GERMAN	10.95	_____
<input type="checkbox"/> 03-3015	CONVERSATIONAL FRENCH	10.95	_____
<input type="checkbox"/> 03-3016	CONVERSATIONAL SPANISH	10.95	_____
<input type="checkbox"/> 03-3017	SPELLING BEE	9.95	_____
<input type="checkbox"/> 03-3018	FUNDAMENTALS OF MATH	9.95	_____
<input type="checkbox"/> 03-3019	TEACHER'S GRADEBOOK	9.95	_____
<input type="checkbox"/> 03-3020	INTRODUCTION TO CHEMISTRY	10.95	_____
<input type="checkbox"/> 03-3021	COMPUTER COACH	10.95	_____
<input type="checkbox"/> 03-3022	WORD QUEST	9.95	_____
<input type="checkbox"/> 03-3023	DOOBARRY DOMINO THE COUNTING PHENOMENO	9.95	_____
CATEGORY: ENTERTAINMENT SOFTWARE			
<input type="checkbox"/> 02-4001*	MIXED GAME BAG II	\$ 9.95	_____
<input type="checkbox"/> 02-4002*	CHALLENGER II	9.95	_____
<input type="checkbox"/> 02-4003*	MIXED GAME BAG III	9.95	_____
<input type="checkbox"/> 02-4004*	BAT CAGE	9.95	_____
<input type="checkbox"/> 03-4000	CHESS AND CHESS CLOCK	14.95	_____
<input type="checkbox"/> 03-4001	BACKGAMMON AND DICE	14.95	_____
<input type="checkbox"/> 03-4002	GAMBLER	14.95	_____
<input type="checkbox"/> 03-4003	CUBE GAME	12.95	_____
<input type="checkbox"/> 03-4004	GRIMM'S FAIRY TRAILS	14.95	_____
<input type="checkbox"/> 03-4005	MIXED GAME BAG I	9.95	_____
<input type="checkbox"/> 03-4006	SUPERMAZE	14.95	_____
<input type="checkbox"/> 03-4007	BIG FLAPATTACK	12.95	_____
<input type="checkbox"/> 03-4008	RAM RUNNER	12.95	_____
<input type="checkbox"/> 03-4009	PUZZLER	12.95	_____
<input type="checkbox"/> 03-4010	PINBALL	12.95	_____
<input type="checkbox"/> 03-4011	STOCK MARKET GAME	12.95	_____
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*2K SOFTWARE (all others 16K)

Please add \$2.50 shipping and handling.

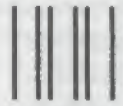


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P.O. BOX 1033
MERIDEN, CT. 06450

POSTAGE WILL BE PAID BY ADDRESSEE

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Please fold, tape, and mail together with check, money order or credit card information. Coupons may be inserted as well, if desired.
Software purchased or selected for this "2-fer" offer cannot be returned for refund or credit. Exceptions will be made only for defects in materials or workmanship.

Please allow 4-6 weeks for Delivery
Residents of Connecticut Please add 7 1/2% Sales Tax
Remember that **TIMEX** software is also available at your local **TIMEX** retailer

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City _____ State _____ Zip _____

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MASTERCARD Account No. _____
Card Expiration Date _____

COST OF CASSETTES: _____
SHIPPING AND HANDLING _____
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TOTAL AMOUNT _____
\$ _____
\$ _____
\$ 2.50
\$ _____

TIMEX

2090

JOYSTICK COUPON

**T/S 2090
Command Stick™
Early Bird Price:
\$14.95 (each)**

- For T/S 2068 Personal Computer
- Hand-contoured
- Accurate Up, Down, and Diagonal Directional Control
- Responsive Fire Button
- Facilitates Cursor Movement and Cursor Positioning for Graphics, Educational and Business Programs
- Fully Compatible with most Atari™ and Commodore™ Video Games and Computers



Coupon Expires November 30, 1983

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COMPUTER RECORDER COUPON

**T/S 2020
Program Recorder
Early Bird Price: \$49.95**

☐ Optional AC Adapter: \$7.95*

- Specifically made for TIMEX Computers
- Compatible with T/S 1000, T/S 1500, and T/S 2068
- Choice of Battery or Optional AC* Operation
- LED Recording Level Indicator
- Built-In Tape Counter



*Requires AC adapter.

Coupon Expires November 30, 1983

2020

TIMEX

TIMEX

1500

NEW CARTRIDGE SOFTWARE COUPON

**T/S 1000/1500
COMMAND CARTRIDGE™**

- | | |
|--|---------|
| <input type="checkbox"/> 07-9001 SUPERMATH | \$19.95 |
| <input type="checkbox"/> 07-9002 STATES AND CAPITALS | \$19.95 |
| <input type="checkbox"/> 07-9003 CHESS | \$19.95 |
| <input type="checkbox"/> 07-9004 FLIGHT SIMULATOR | \$19.95 |

*Requires optional Command Cartridge Player.



Coupon Expires November 30, 1983

1500

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1510

PRE- INTRODUCTION COUPON

**Command Cartridge Player
Early Bird Price: \$19.95**

- For T/S 1500 and T/S 1000 Personal Computers
- Accepts Instant-Load Cartridges
- Up to 24K of Instant Programs
- Easy Plug-in Installation
- Software for Home, Business, Education, and Entertainment



Coupon Expires November 30, 1983

1510

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T/S 1510 COMMAND CARTRIDGE™ PLAYER ORDER COUPON

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TIMEX COMPUTER CORPORATION

P.O. BOX 1033
MERIDEN, CT 06450

Quantity ____ Cost \$ ____ Shipping & Handling \$ ____ Sales Tax \$ ____ TOTAL \$ ____
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CITY, STATE, ZIP ____

Please allow 4-6 weeks for delivery.

For faster service you may place your order by phone. Simply call 1-800-24-TIMEX.
Remember that **TIMEX** Computer products are also available at your local **TIMEX** retailer.
*Residents of Connecticut, please add 7 1/2% sales tax.

T/S 1000/1510 COMMAND CARTRIDGES™ ORDER COUPON

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T/S 2020 CASSETTE RECORDER ORDER COUPON

This offer is good only in the U.S.A. and is void where prohibited or restricted. Offer ends November 30, 1983, and order must be received by December 31, 1983. All orders are subject to availability of the particular product. Please include \$5.00 per recorder for shipping and handling plus applicable sales tax*, if any. Please make your check or money order payable to **TIMEX** or indicate the appropriate credit card information and mail coupon and payment to:

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MERIDEN, CT 06450

Recorder Quantity ____ Cost \$ ____ Adapter Quantity ____ Cost \$ ____
Shipping & Handling \$ ____ Sales Tax \$ ____ TOTAL \$ ____
VISA No. ____ MasterCard No. ____ Expiration Date ____

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NAME ____
ADDRESS ____
CITY, STATE, ZIP ____

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T/S 2090 JOYSTICK ORDER COUPON

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ADDRESS ____
CITY, STATE, ZIP ____

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Remember that **TIMEX** Computer products are also available at your local **TIMEX** retailer.
*Residents of Connecticut, please add 7 1/2% sales tax.

TIMEX

PRINTER & PAPER COUPON

2040

T/S 2040™
**Personal Printer &
 Free Printer Paper: \$99.95**

- Speed: 2-Lines per second
- Print width: 32-Characters Horizontally
- Compatible With: **T/S 1000, T/S 1500, T/S 2068**
- Sturdy, Long-lasting Print Mechanism
- Quiet, Economical Operation



**INCLUDES 2 FREE
 PRINTER PAPER
 3-PACKS
 (an \$11.90 value)**

Coupon Expires November 30, 1983

2040

TIMEX

TIMEX

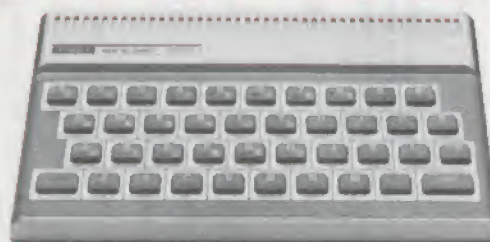
T/S 1500™ COMPUTER COUPON

1500

T/S 1500™
Early Bird Price: \$79.95

- On-board 16K RAM
- Cassette or Drop-in Cartridge* Software
- One-Stroke Keyword Entry
- Built-in Programmable Graphic Characters
- Typewriter-Style Keyboard

**Requires optional Command Cartridge Player.*



Coupon Expires November 30, 1983

1500

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SOLID STATE SOFTWARE COUPON CARTRIDGE

2000

**T/S 2000
 COMMAND CARTRIDGE™**
 Up to 56K of
 program-memory.

- ☐ No. 07-2000 BUDGETER \$34.95
- ☐ No. 07-3000 FLIGHT SIMULATOR \$39.95
- ☐ No. 07-3001 STATES & CAPITALS \$29.95
- ☐ No. 07-4005 CRAZY BUGS \$29.95
- ☐ No. 07-4001 ANDROIDS \$34.95
- ☐ No. 07-4004 CASINO I \$29.95



Coupon Expires November 30, 1983

2000

TIMEX

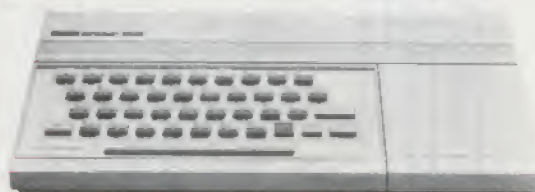
TIMEX

COLOR COMPUTER COUPON

2068

T/S 2068™
Early Bird Price: \$199.95

- Full 72K Memory
- Typewriter-Style Keyboard
- 8-Colors; High Resolution Graphics
- 4-Sound Channels
- Instant-Load Cartridge and Standard Cassette Software



Coupon Expires November 30, 1983

2068

TIMEX

T/S 2068™ PERSONAL COMPUTER ORDER COUPON

This offer is good only in the U.S.A. and is void where prohibited or restricted. Offer ends November 30, 1983, and order must be received by December 31, 1983. All orders are subject to availability of the particular product. Please include \$5.00 per computer for shipping and handling plus applicable sales tax*, if any. Please make your check or money order payable to **TIMEX** or indicate the appropriate credit card information and mail to:

TIMEX COMPUTER CORPORATION
P.O. BOX 1033
MERIDEN, CT 06494

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CITY, STATE, ZIP ____

Please allow 4-6 weeks for delivery.

For faster service you may place your order by phone. Simply call 1-800-24-TIMEX. Remember that **TIMEX** Computer products are also available at your local **TIMEX** retailer.

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T/S 2000 COMMAND CARTRIDGES™ ORDER COUPON

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TIMEX COMPUTER CORPORATION
P.O. BOX 1033
MERIDEN, CT 06450

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VISA No. ____ MasterCard No. ____ Expiration Date ____

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*Residents of Connecticut, please add 7½% sales tax.

T/S 1500™ PERSONAL COMPUTER ORDER COUPON

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TIMEX COMPUTER CORPORATION
P.O. BOX 1033
MERIDEN, CT 06450

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VISA No. ____ MasterCard No. ____ Expiration Date ____

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ADDRESS ____

CITY, STATE, ZIP ____

Please allow 4-6 weeks for delivery.

For faster service you may place your order by phone. Simply call 1-800-24-TIMEX. Remember that **TIMEX** Computer products are also available at your local **TIMEX** retailer.

*Residents of Connecticut, please add 7½% sales tax.

T/S 2040 PRINTER & FREE PRINTER PAPER ORDER COUPON

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P.O. BOX 1033
MERIDEN, CT 06450

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VISA No. ____ MasterCard No. ____ Expiration Date ____

PLEASE PRINT:

NAME ____

ADDRESS ____

CITY, STATE, ZIP ____

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For faster service you may place your order by phone. Simply call 1-800-24-TIMEX. Remember that **TIMEX** Computer products are also available at your local **TIMEX** retailer.

*Residents of Connecticut, please add 7½% sales tax.

School of Thought Continued

cated hardware can be introduced to stimulate and challenge the student.

For example, at the elementary level, the sturdy **T/S 1000** is perfect for inaugurating the computer literacy program. At the next step up-the-ladder, the **T/S 1500** with its 16K on-board RAM and typewriter-style, push-button keyboard is more appropriate for the intermediate-level student. At the advanced stage, the larger memory and the greater complexity of the full-color **T/S 2068** challenges the skills of the "computer expert."

The **TIMEX** Education Program recommends the use of the 1000 series for grammar scholars from K to 6th grade, the **1500** for 7th to 10th graders, and the **2000** series from 11th grade on up.

Administrative Software — **TIMEX** software also minimizes mundane recordkeeping chores associated with teaching and office administration.

For the teacher, **TIMEX** software helps reduce the amount of time spent on grading, testing, and student evaluations so more hours can be devoted to teaching.

In the office, the **TIMEX Personal Computer** helps alleviate the paperwork burden connected with attendance, class scheduling, student and teacher records, and school bus routing and dispatching.

Self-Teaching Software — **TIMEX** CMI (Computer Managed Instruction) encourages the strengthening of old skills and the fortification of new ones at the student's own, comfortable, pace.

Individual software modules (under development) for SAT preparation, Driver's Education, Word Processing, and Vocational Training offers individualized instruction, immediate feedback, positive reinforcement, and stimulates good study habits — in a no-pressure type of environment.

Minimal Investment — One of the very serious concerns in the education community today revolves around the requirement of funding worthy programs like those for computer literacy.

In recognition of these exigencies, a specially price package is available to schools, colleges, computer camps and libraries. So competitive is the **TIMEX** Education Program offer, an entire computer lab for some 20-students can be equipped with **TIMEX** equipment for less than the price of a single, higher-priced microprocessor.

Additionally, fund raising activities can be implemented to minimize the strain upon the school district budget.

Fund Raising — Fund raising plans — featuring the **TIMEX Personal Computer** — have two very big advantages: First, the **T/S** computer can be purchased by the

student or parent for home use to practice skills learned at school; and second, the school earns **free** computers for use in the classroom.

Educator's Newsletter — This quarterly publication is available to all educators interested in the **TIMEX** Educators Program. It is sponsored and published jointly by the Educators User Group at Texas Wesleyan College and **TIMEX**.

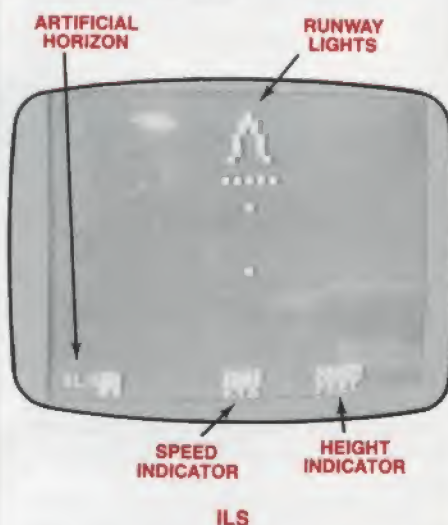
If this school of thought has provided you with food for thought, write for more information (and a subscription to **TEC NEWS**) to:

Dr. Mark Wasicsko
Associate Dean
School of Education
Texas Wesleyan College
Fort Worth, TX 76105

*Pilot to Control Tower Continued*

must be lowered, airspeed and altitude must be reduced, and the plane must be aligned with the runway prior to the landing.

When you turn onto the final approach, you'll want to use the Instrument Landing System (ILS) (illustrated below) to achieve a successful touchdown.



At the top of the ILS you'll see the horizon (light shaded area). Below it is the runway and its landing lights. As your airplane approaches touchdown, the display moves towards you — just as if you were actually piloting a real plane.

On the bottom of the ILS you'll find the artificial horizon, a speed gage, and a height (Radio Altimeter) indicator.

The square gage on the far left-side of the ILS acts as an artificial horizon; it indicates the start of the runway relative to the position of the plane: The start of the runway

is displayed as a flashing light within the gage. If the plane is squarely aligned with the runway, the light will flash in the center of the gage; if the flashing light is at the left or right-side(s) of the gage, the position of the plane is slightly off-course and should be adjusted before touchdown. When the flashing light is above the gage, the plane is descending too steeply; if below the gage, the plane is not descending steeply enough.

Aircraft speed is displayed in the center indicator. Reduce airspeed as you land, but do so carefully so the engines won't stall.

Finally, the radio altimeter uses a radio-beam reflection system to measure the height of the airplane's wheels above the runway. This height (in feet) is displayed in the far right indicator on the ILS.

PILOT TALK

Although we don't want to eliminate the challenge and fun you'll experience while learning to fly with the **TIMEX Flight Simula-**

Continued on Page 6

EARLY BIRD COUPON SPECIALS FOR MEMBERS OF THE TIMEX COMPUTER CLUB

We promised you "early bird" notification of excitingly new products and special offers from **TIMEX Computer Corporation**, so here we go!

Now you can purchase **TIMEX** computer products directly from **TIMEX** if you are unable to find them at your local **TIMEX** retailer.

And, coupon shopping makes ordering — direct from **TIMEX** — easier than ever. In this issue of **RAMBLINGS**, you'll find valuable, "early bird" coupons for the newest additions to the **TIMEX** computer line, plus a special offer for the **TIMEX Personal Printer**.

For example, "early bird" coupons allow you to place early orders for the following, soon-to-be-released **TIMEX** computer products: The **T/S 2068™ Color Personal Computer**, the **T/S 1510 Command Cartridge™ Player**, the **T/S 2020 Program Recorder™**, the **T/S 2090 Command Stick™**, and the new instant-load cartridge software for both the **T/S 2068** and the **T/S 1500** computers.

Finally, a special offer coupon for the **TIMEX Personal Printer** includes a **FREE** bonus of two 3-roll packs of printer paper (an \$11.90 value).

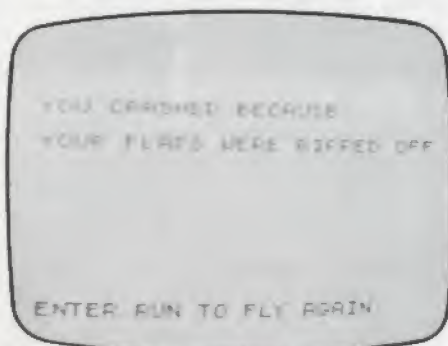
But, act quickly! 1983 supplies are strictly limited for some items.

Remember, the early bird gets first choice!

Pilot to Control Tower Continued

for software cassette, the following tips will help you make a smooth and successful flight:

- Pay careful attention to the indicators and gauges on the Instrument Panel.
- Utilize the Beacons as a navigation aid to reach the airport.
- Don't let the airspeed drop to the point where the engine stalls (there is a minimum speed, but we won't ruin your fun by telling you what it is).
- Avoid engaging full flaps and landing gear at excessive rates of speed; if you do, they will be torn off the aircraft and you will crash.



CRASH REPORT

HAPPY LANDINGS!



The official **TIMEX®** Computer Club Newsletter, is published monthly by **TIMEX** Computer Corporation, P.O. Box 2655, Waterbury, CT 06725. Please direct all correspondence to the Editor.

Editor
Paul Schirloff

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ENTER THE TIMEX SOFTWARE CONTEST

We've got an exciting and fun-filled contest on tap for you — and valuable prizes for the winner!

HERE'S HOW IT WORKS!

Currently, **TIMEX** has released more than 70-different software cassettes for use in the house, your business, for your family's education, and for your pleasure and enjoyment. We're awarding prizes (1st, 2nd, and 3rd place) for the best and most original use of any **TIMEX**-produced software product.

The prizes are:

- 1ST PLACE** — **TIMEX** Personal Printer (1 winner)
- 2ND PLACE** — Three **TIMEX** Software Cassettes of your choice (4 winners)
- 3RD PLACE** — **TIMEX** Tee Shirt (10 winners)

To enter this contest, mail a tape cassette which contains your submission, together

with a brief note of instructions explaining the purpose of your application and how to run it — to the **RAMBLINGS** Editor. All entries must be received by no later than November 30, 1983.

No purchase is necessary and you can enter the contest as many times as you wish, however, each entry must be mailed in a separate envelope and only one prize to a contestant. All entries become the property of **TIMEX** Computer Corporation and none can be returned. We are not responsible for lost or mislaid entries and the decision of the judges is final. Employees of **TIMEX**, their relatives, **TIMEX** advertising agencies, and **TIMEX** distributors are ineligible. Previously published and/or commercially marketed software, and software not developed by the contestant are also ineligible.

Here's your chance to win a valuable prize. All prize winners will be notified by mail and their names will be announced in a future issue of **RAMBLINGS**.

2ND PLACE



1ST PLACE



3RD PLACE



RAMBLIN' AROUND

Regardless of whether you're a beginner or an expert, one of the best ways to fully utilize your **TIMEX** Personal Computer is to share your enthusiasm and ideas with other members of your local **T/S** User's Group.

T/S Users' Groups — like the ones listed below — would like to hear from new members like you.

CALIFORNIA

Sinclair Users' Group of Sonoma County
8552 Loretto Avenue
Cotati, CA 94928
Contact: Paul Kayler

South Bay Computer Club
2316 Walnut Avenue
Manhattan Beach, CA 90266
Contact: John W. Peterson

STUMP
109 Novema Road
Monterey, CA 93940
Contact: John S. Caylor

OREGON

Clackamas County ZX/TS Users' Group
2615 SE Courtney Road #19
Milwaukie, OR 97222
Contact: Bob Evans or Dennis Jurries

VIRGINIA

SLUG (Franklin County Sinclair Local Users' Group)
Route 1, Box 21
Glade Hill, VA 24092
Contact: Gary Preston

Timex Users' Group
P.O. Box 1706
Roanoke, VA 24008
Contact: Jim Worthly

TEXAS

Houston Timex Sinclair Users' Group
13327 Rain Lily Lane
Houston, TX 77083
Contact: David C. Bonner

To learn the name and location of your local **T/S** User's Group, please call our toll-free number 1-800-24-TIMEX.

THE FORUM

LETTERS TO THE EDITOR

HERE'S A REM TO REMEMBER

As suggested by Robert Cauffman of Chambersburg, Pennsylvania, a **REM** can be a valuable programming tool and a big help during the testing, editing and debugging aspects of programming.

Bob shows us how a temporary program change can be made without losing the original statement. This is accomplished by converting the original statement into a **REM** as illustrated by the following example:

FROM:

```
410 LET LS(N) = SS( TO 29)
415 GOTO 500
```

```
410 REM LET LS(N) = SS( TO 29)
411 LET LS(N) = SS( TO 23)
415 GOTO 500
```

TO:

```
2391 LET BA = INT (BA*100 + .1)/100
```

BUGS AND GREMLINS

Because the T/S 1000 series accurately "crunches numbers" to 9½ significant digits — of which only 8 are printed — a rounding-off error can inject an incorrect balance into the **TIMEX Checkbook Manager** software cassette.

According to David Farmer of Norfolk, Virginia, this bug can easily be corrected by adding the following statement to the program (be sure to make the correction before entering any data).

In addition, the **TIMEX States and Capitals** software cassette also contains a small bug: The capital of Florida, Tallahassee, is spelled with one "e" instead of two. Dave tells us to edit line 8528 to correct the error.

PROGRAMMING CAN BE FUN

You can duplicate the following programs in the **TIMEX Personal Computer** to find out just how much fun programming can be. We are indebted to the T/S users identified by the first program REM for submitting the programs to **RAMBLINGS**.

CALCULATOR

This easy-to-use "adding machine" program makes quick work of repetitious additions and lines-up totals at the right margin. To continue the program from the last total, press the **K** and then the **ENTER** keys. After entering the program, **RUN** to execute; **BREAK** to stop.

```
4 REM BY EDGAR E. CLARK, ST.
PETERSBURG, FL.
5 REM CALCULATOR
10 DIM Z$(20,10)
15 LET T = 0
20 LET ZZ = 0
30 FOR N = 1 TO 20
40 PRINT TAB 7; "CALCULATING
ROUTINE"; TAB 32; "ENTER FIRST
NBR";
50 PRINT "--OR TO USE LST TOTAL AS
NEW ENTRY PRESS K AND ENTER"
60 INPUT Z$(N)
70 LET T = T + VAL Z$(N)
80 PRINT TAB 18; N; TAB 21; Z$(N)
90 PRINT TAB 20; "T = "; T;
100 LET K = T
110 IF VAL Z$(N) = ZZ THEN PRINT TAB
18; "FINAL "; T;
120 IF VAL Z$(N) = ZZ THEN GOTO 15
130 PRINT TAB 0; "NEXT NBR";
140 LET N = N + 1
150 GOTO 60
160 REM
170 REM
```

BOBSLED

Fast-action 2K Bobsled game challenges your reflexes and tests your ability to transverse a winding course. To get the Bobsled (V) to the finish line without crashing into the walls, press key **1** to move left, or key **0** to ski to the right. A scoreboard keeps track of how well you've done.

Enter the program listed below:

```
5 REM BY ROBERT J. MIDURA,
WORCESTER, MA.
7 REM BOBSLED
10 SCROLL
15 PRINT AT 9,C;" "
20 LET C = C + (INKEY$ = "0") -
(INKEY$ = "1")
25 PRINT TAB C;
30 IF PEEK (PEEK 16398 + 256 * PEEK
16399) < > 14 THEN GOTO 65
35 PRINT "V";
38 LET S = S + 1
40 LET P = P + RND * 2 - 1
45 LET P = P + (NOT P) - (P > 27)
50 PRINT AT 21,P;SS(S/30 + 1)
60 GOTO 10
65 FOR L = 1 TO 10
70 PRINT AT 10,C;"V";AT 10,C;" "
75 PRINT AT 10,C;" "
80 NEXT L
85 PRINT TAB 10; "SCORE"; S
90 STOP
1000 LET P = 14
1005 FOR L = 1 TO 22
1010 PRINT TAB P;SS(1)
1015 NEXT L
```

```
1025 LET C = 16
1030 PRINT AT 10,C;"V"
1035 LET S = 0
1040 GOTO 10
```

Then, type the following commands without line numbers; be sure to press the **ENTER** key after each command:

```
DIM SS(5,5)
LET SS(1) = " "
LET SS(2) = " "
LET SS(3) = " "
LET SS(4) = " "
LET SS(5) = "FINI"
```

Press **RUN** to execute the program and **BREAK** to stop it.



MAILBOX

First and foremost, **RAMBLINGS**, the **TIMEX Computer Club Newsletter** is a forum for you, the T/S user. Through this vehicle, T/S users — throughout the country — can exchange valuable and useful techniques, ideas, programs, and discuss other topics of mutual interest.

We gratefully solicit your articles, programs, suggestions, critiques, and brainstormers. Please mail your contributions to the **RAMBLINGS** Editor. All contributions become the property of **TIMEX** and none can be returned. We reserve the right to edit contributed materials to conform to space or editorial policies.

And if we publish your material during October through December, we'll say thank you by sending you a gift of two **TIMEX** software cassettes of your choice.

COMPUTER VOCABULARY

Computer terminology is a specialized and unique language. To the first-time or uninitiated computer owner, this "jargon" can be misleading or confusing.

Each issue, we'll list some of the common (and not so common) computer terms. These highly simplified definitions will help you better understand your computer and its "lingo". Spend a few minutes to learn these terms, and you'll soon be talking like a computer professional.

Bug — A bug is an error in a program which causes the program to fail (stop) or causes the program to run in a fashion that does not produce the intended result. A

Syntax error, for example, is a type of bug. However, the **T/S Personal Computer** identifies the **Syntax** error immediately; you won't spend hours looking for it later.

Debugging — Systematic approach to isolating — and correcting — bugs in a program. When a program is debugged, the programmer examines the program — line-by-line — to identify a bug, and then proceeds to edit the program to enter the correction.

Report Code — Identifies a bug in a program. It is signified — at the bottom of the screen — by a number (or letter) and a statement number (indicates the statement at which the program stopped). A list of error (report) codes are listed in the rear of your **T/S 1000** User Manual for easy reference.

Flowchart — Pictorial diagram to identify all steps of a program.

Graphic Characters — Characters used to create a graphical display such as a bar graph or a picture. Resulting graphics can be reproduced on your TV screen or **TIMEX Printer**. Twenty graphics keys — on the **T/S 1000** keyboard — can be used to produce the appropriate graphics.

Intelligent Terminal — A particular type of terminal which can perform certain functions independently of the computer. Since the program is stored in the terminal's memory — instead of in the computer — additional memory is available in the computer for other programs and/or data.

Keyword — Certain commands which prompt the computer to perform a particu-

lar function (i.e. **PRINT**). The **TIMEX Personal Computer** offers a unique system of displaying any of the 37-keywords by pressing a single key (sometimes the SHIFT key must also be pressed) rather than the tedious practice of typing each word individually.

Load — Method by which, a program (with or without data) that is stored on an external storage media (tape or disc) can be transferred into the computer's internal memory.

Save — Method by which, a program (with or without data) — stored in the computer's internal memory — can be transferred to an external storage media (tape or disc).

Special Character — On the **TIMEX Personal Computer**, any character other than a number, letter, or graphics character is a special character (i.e. \$, +, etc.). The **T/S 1000** incorporates 21-special characters within the 40-key keyboard.

Thermal Printer — A Printer that utilizes a combination of heat and chemically treated paper to print letters, numbers, graphic characters, or special characters as hard copy.

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